

1 1. A method for treating a liquid contaminated starting material having mineral
2 elements and charged ions, said mineral elements and charged ions being solvated,
3 chelated, or complexed in a structural arrangement, said method comprising the steps
4 of:

5 contacting said starting material with an aqueous caustic silica solution
6 consisting of:

7 an admixture of silica and at least one compound selected from the group
8 consisting of sodium hydroxide, potassium hydroxide, and ammonium hydroxide;
9 said aqueous caustic silica solution comprising from about 0.5% to about
10 5% w/w dissolved silica and about from 5% to about 60% w/w of a hydroxide
11 component;

12 prolonging said contact between said aqueous caustic silica solution and said
13 starting material for effecting breaking apart of said structured arrangement;

14 releasing said mineral elements and said charged ions from said structured
15 arrangement;

16 solubilizing said released mineral elements and said released charged ions in
17 said aqueous caustic silica solution; and

18 sustaining said solubility of said released mineral elements and said released
19 charged ions in said aqueous caustic silica solution, for subsequent extraction
20 operations.

21 2. The method according to claim 1, wherein said contacting step is performed at a
22 temperature of 10-200°C.

23 3. The method according to claim 1, wherein said prolonging step is performed for a

- 1 period of 10 minutes to 6 hours.
- 2 4. The method according to claim 1, wherein said contacting step is performed under
- 3 a pressure of 0.1 to 5 Mpa.
- 4 5. The method according to claim 1, wherein said prolonging step is performed under
- 5 a pressure of 0.1 to 5 Mpa.
- 6 6. The method according to claim 1, wherein said mineral elements are selected from
- 7 the group consisting of heavy metals, noble metals, platinum group metals, and toxic
- 8 metals.
- 9 7. The method according to claim 1, wherein said mineral elements are selected from
- 10 the group consisting of Pb, Au, Cd, Zn, As, Ba, Cr, Hg, Se, Ag, Pt, Ti, V, Mo, Zr, and Pd.
- 11 8. The method according to claim 1, wherein said starting material comprises toxic
- 12 waste.
- 13 9. The method according to claim 1, wherein said starting material comprises aqueous
- 14 engraving solution waste.
- 15 10. The method according to claim 1, wherein said starting material comprises
- 16 aqueous aircraft manufacturing solution waste.
- 17 11. The method according to claim 1, wherein said starting material comprises
- 18 aqueous battery manufacturing solution waste.
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